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ABSTRACT

A study was done to determine the relationships between the revised Occupation Analysis Inventory (OAI) work-dimension scores and job ability-requirement estimates and the ability test scores of job incumbents and graduate trainees in related vocational/technical education programs. (The OAI is an instrument containing 622 work elements which are descriptions of work activities and conditions on which jobs and occupations are rated. In earlier studies, the OAI work elements were reduced to a lesser number of work-dimensions.) The worker (criterion) variable consisted of the mean General Aptitude Test Battery (GATB) scores of job incumbents in 195 occupations and the mean general vocational capability tests scores of graduate trainees in twenty-nine postsecondary occupational education programs. The occupational (predictor) criterion was derived from the OAI and consisted of work-dimension scores and ability-requirement estimates derived from OAI job ratings of all the occupations for which criterion data were obtained. Statistical analyses supported the construct validity of the OAI variables. It was concluded that the OAI work-dimension scores and job ability-requirement estimates possess demonstrated relevance to the measured abilities of job incumbents and graduate trainees. (Sample and mean scores for vocational capability data, sample for GATB data, and titles of the work dimensions are appended.) (Author/EH)

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ABILITY CORRELATES OF SYSTEMATICALLY DERIVED OCCUPATIONAL
VARIABLES: A REPEATED STUDY

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CENTER FOR OCCUPATIONAL EDUCATION
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J. W. Cunningham, Program Director

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(1) If the avowed purpose of education is to prepare the individual for a meaningful role in adult society, then we must establish relationships between the activities and conditions to which the student is exposed in the educational setting and those which he/she is likely to encounter upon leaving that environment.

(2) There is an established technology, "ergometrics" (or quantitative activity analysis), that can be used in gathering and organizing information about the domain of adult activities for educational development purposes.

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ABSTRACT

Significant relationships were established between a revised set of occupational variables and the measured abilities of workers and graduate trainees in various occupations. The occupational (predictor) variables were derived from the Occupation Analysis Inventory (OAI) and consisted of (a) work-dimension (factor) scores describing jobs in terms of work activities and conditions and (b) ability-requirement estimates characterizing jobs in terms of selected human abilities measured by existing tests. (The ability-requirement estimates were derived through E. J. McCormick's job-component procedure.) The worker (criterion) variables consisted of the mean General Aptitude Test Battery scores of job incumbents in 195 occupations and the mean general vocational capability test scores of graduate trainees in 29 post-secondary occupational education programs. Jobs representing all of the occupations for which criterion data were obtained were rated on the OAI, and the ratings were used in deriving work-dimension (factor) scores and ability-requirement estimates for the jobs. The results of various statistical analyses generally supported the construct validity of the OAI variables. Of 28 relationships tested under three general hypotheses, 22 were found to be statistically significant. In general, the OAI (occupational) variables showed stronger relationships with cognitive than psychomotor ability tests. Contrary to expectations, the relationships obtained in this study using revised OAI variables were no stronger than those obtained previously with the original (presumably less stable) OAI variables. Based on the results, it was concluded that the OAI work-dimension scores and ability-requirement estimates for jobs possess

demonstrated relevance to the measured abilities of job incumbents and graduate trainees in job-related vocational/technical education programs. The OAI variables should prove useful in research and development.

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INTRODUCTION

The study reported here was part of a long-range effort, the Ergometric Research and Development Project, directed toward the development of a quantitative occupational taxonomy applicable to occupationally related education and guidance.

The Ergometric Project began with the development of the Occupation Analysis Inventory (OAI), containing 622 "work elements" (descriptions of different types of work activities and conditions) on which jobs and occupations are rated (Cunningham, Tuttle, Floyd, and Bates, 1971). The OAI work elements were generated within a broad information-processing framework consisting of the following components: (a) Information Received, (b) Mental Activities, (c) observable Behavior, (d) Work Outcomes (compared to goals), and (e) Work Context. These major components were, in turn, subdivided according to selected conceptual frameworks pertaining to human behavior and work technology, and the work elements were developed within the resultant subcategories. The completed instrument represented an attempt to achieve as much specificity (or content loading) in occupational description as possible, while retaining its applicability to the entire occupational spectrum (i.e., without limiting the instrument to a restricted range of jobs and occupations).

Since its construction, the OAI has been applied to 1414 jobs, and the job-rating data have been subjected to a series of factor analyses that have reduced the 622 OAI work elements to a lesser number of basic work dimensions (Riccobono and Cunningham, 1971a, 1971b; Boese and Cunningham, 1975). In the latest factor analytic study, eight

separate sections of OAI work elements were subjected to factor analyses which produced a total of 132 rather specific first-order work dimensions (factors). Those first-order work dimensions were, in turn, subjected to a single, overall factor analysis which yielded 28 general (higher-order) orthogonal work dimensions. In general, both the first- and the higher-order work dimensions were meaningful and stable (as determined by Tucker's coefficient of congruence). Moreover, two recently completed studies have demonstrated the potential utility of the OAI work dimensions as bases for the development of occupationally related interest scales (Cunningham, Slonaker, and Riegel, 1975) and as profile variables in the derivation of occupational clusters (Pass and Cunningham, 1975a).

Since the OAI was designed to analyze and describe jobs in terms relevant to human behavior, it was considered both desirable and feasible (based on existing technology) to link the OAI work elements to defined human attributes in the cognitive, psychomotor, and affective domains (i.e., to selected abilities, interests, and needs). Accordingly, 103 human attributes were defined for which there were existing tests or inventories in the three domains. Estimated requirements were then established for each OAI work element on each of the 103 human attributes, according to the job-component (or synthetic) procedure developed by E. J. McCormick at Purdue University (McCormick, Cunningham, and Thornton, 1967; McCormick, Jeanneret, and Mecham, 1972; Neeb, Cunningham, and Pass, 1971). The derived linkages between the OAI work elements and the 103 measurable human attributes expanded the capability of the OAI; based on those linkages, the OAI could provide estimates of a job's requirements for the aforementioned human attributes, as well as a

description of the activities and conditions (in terms of work elements and dimensions) involved in the job.

In two subsequent studies, the attribute-requirement weights developed by Neab et al. for the OAI work elements were used to derive attribute-requirement estimates for samples of jobs that had been rated on the OAI. Essentially, the procedure for deriving the attribute-requirement estimates consisted of summing the cross-products of a job's ratings on the OAI work elements times the elements' weights on the attribute in question. (For a description of this procedure, see Tuttle and Cunningham, 1972, or Pass and Cunningham, 1975b.) In one of the two studies (Tuttle and Cunningham, 1972), the work-dimension (factor) scores and interest- and need-requirement (reinforcement) estimates for a sample of jobs were related to the scores of job incumbents on selected interest, need, and satisfaction inventories. A number of statistical analyses were performed in order to test seven general hypotheses concerning relationships between the OAI job variables and the scores of job incumbents on the forenamed affective measures. Of those seven hypotheses, five received substantial support, and the remaining two were at least partially supported. From the results, it was concluded that the OAI work-dimension scores and attribute-requirement estimates for jobs and occupations possess demonstrated relevance to the interests, needs, and satisfactions of job incumbents.

Of particular interest for purposes of the present report is a second study conducted by Bates and Cunningham (in press), who attempted to establish relationships between (a) the OAI work-dimension scores and ability-requirement estimates for jobs and (b) the General Aptitude Test

Battery (GATB) and general vocational capability (GVC) test scores of job incumbents and graduate trainees in selected post-secondary vocational/technical education programs. In one set of analyses, jobs were clustered based on their OAI factor-score profiles, and analyses of variance were performed in which clusters comprised the categories of the independent variable and the GATB scores of job incumbents were treated as dependent variables. Of the eight analyses of variance performed (one for each of the eight GATB scores), seven showed significant differences among the OAI-based job clusters in terms of the measured abilities of persons employed in those clusters. Analyses of variance were also performed across job clusters using as dependent variables the general vocational capability (GVC) test scores of graduate trainees in relevant vocational/technical education programs. Those analyses showed significant differences among clusters on all eight of the GVC tests administered. In addition to the analyses involving job clusters derived from the OAI work dimensions, the work-dimension scores of jobs were correlated directly with the mean GATB scores of job incumbents. Thus, for each of the eight GATB tests, a multiple correlation was computed using jobs' higher-order work dimension scores as predictors and the mean scores of job incumbents as the dependent variable. Of the eight multiple correlations computed with a sample of 286 jobs, all were statistically significant; the median cross-validated coefficient computed from split samples was .59.

In the same study, Bates and Cunningham attempted to establish relationships between the OAI ability-requirement estimates for jobs and the ability test scores of job incumbents and graduate trainees in

related vocational/technical education programs. In one set of analyses, the estimated ability requirements for 291 jobs were correlated with the mean scores of incumbents in those jobs on the eight GATB tests, i.e., each ability-requirement variable was correlated with a corresponding GATB test. Of the 12 relevant correlations computed, 9 were statistically significant; the median correlation was .60. In general, the correlations for the cognitive abilities were significant and substantial while those involving the psychomotor abilities were not significant. A second set of analyses related the estimated requirements of 29 jobs for eight general vocational capabilities (GVC's) to the GVC test scores of graduate trainees in post-secondary vocational/technical education programs relevant to those jobs. In those analyses, jobs were divided into high and low categories based on their estimated requirements for a specified GVC, and the two categories were compared statistically in terms of the scores of graduate trainees on the relevant GVC test. Of the eight analyses performed (one for each GVC), seven showed significant differences in favor of the high-requirement category. Based on their results, Bates and Cunningham concluded that the OAI work-dimension scores and ability-requirement estimates for jobs possess demonstrated relevance to the aptitudes of job incumbents and the general vocational capabilities of graduate trainees in job-related vocational/technical education programs.

Encouraged by the findings of the preceding studies, Pass and Cunningham (1975b) undertook to further develop the linkages between the OAI and the previously mentioned 103 human attributes. In this connection, the investigators reasoned that an increase in the number of ratings on which the attribute-requirement weights for the OAI work

elements were based would increase the reliabilities of those weights and, hence, the stability of attribute-requirement estimates for jobs as derived from OAI job ratings. Accordingly, 9 or 10 additional ratings were obtained on the requirements of each OAI work element for each of the 103 defined human attributes, and those ratings were combined with an equal number of previously obtained ratings (Neeb et al., 1971) in deriving a revised set of attribute-requirement weights. The result was a matrix containing a weight for each OAI element on each of the 103 human attributes. The resultant matrix of attribute-requirement weights was then used, in combination with OAI job ratings, to derive the estimated attribute requirements for 1414 jobs. Analyses of the data showed substantial reliabilities for both the attribute-requirement weights for the OAI work elements and, more importantly, the attribute-requirement estimates for a sample of jobs. It was concluded that the results seemed ". . . encouraging in regard to the potential utility of the OAI-based attribute-requirement estimates in occupationally related education and guidance."

The present study was designed to test the construct validity of revised OAI work-dimension scores and ability-requirement estimates for jobs. Whereas the Bates and Cunningham study used OAI work dimensions derived by Riccobono and Cunningham (1971b) and OAI attribute-requirement weights derived by Neeb et al. (1971), the study reported here used more recently developed work dimensions (Boese and Cunningham, 1975) and ability-requirement weights (Pass and Cunningham, 1975b). It was believed that the improved stability of the revised OAI variables would increase the strength of their relationships with the ability tests employed by Bates and Cunningham.

PURPOSE

As noted, this study was designed to determine the relationships between the revised OAI work-dimension scores and ability-requirement estimates for jobs and the ability test scores of job incumbents and graduate trainees in related vocational/technical education programs. Using the revised sets of OAI job variables as predictors, the study re-tested some of the hypotheses tested previously by Bates and Cunningham (in press). The dependent variable data in this study were the same as those used previously: the General Aptitude Test Battery (GATB) scores of job incumbents and the general vocational capability (GVC) test scores of students nearing completion of relevant post-secondary vocational/technical education programs.

The following hypotheses were tested:

Hypothesis 1: There will be positive correlations between the OAI requirement estimates for jobs on eight general vocational capabilities (GVC's) and the mean GVC test scores of graduate trainees in vocational/technical programs related to the jobs. This hypothesis assumed that the mean GVC test score profiles of graduate trainees in the various occupational programs would equal or exceed the requirements of the relevant occupations (i.e., the occupations represented by the OAI-rated jobs) and therefore reflect the GVC requirements of those occupations.

Hypothesis 2: There will be positive correlations between the OAI requirement estimates for jobs on 10 basic cognitive and psychomotor abilities and the mean scores of job incumbents on the eight ability measures in the General Aptitude Test Battery. Hypothesis 2 assumed that (a) people tend to gravitate to and remain in jobs whose requirements

are reasonably compatible with their abilities, and (b) the mean ability test scores of representative samples of job incumbents should therefore reflect the ability requirements of their jobs.

Hypothesis 3: The OAI work-dimension (factor) scores for jobs will predict (through multiple correlation) the mean scores of job incumbents on the eight ability measures in the General Aptitude Test Battery. It was reasoned in this hypothesis that if the OAI work dimensions were meaningful in terms of work-related human behavior, they should correlate with the behavioral potentials of job incumbents as measured by the GATB. The assumption underlying Hypothesis 2 also applied to Hypothesis 3.

PROCEDURES AND RESULTS

The procedures and results are reported in two sections. The first section describes the jobs, subjects, and variables; the second section describes the analyses and results.

Samples and Variables

This section of the Procedures and Results describes the sources and characteristics of the data under three headings: Samples, OAI Variables, and Ability Tests.

The Samples

General vocational capability sample. Measures were taken on eight general vocational capabilities: Mechanical, Electrical, Spatial, Chemical, Biological, Symbolic, People, and Style and Grooming. Tests of these capabilities (to be described later) were administered to successful students nearing completion of 29 different vocational or technical programs in the North Carolina community college system. The 29 programs were selected based on three criteria: (a) the programs had to be related to identifiable occupations in the Dictionary of Occupational Titles (DOT) (U. S. Department of Labor, 1965), (b) there had to be adequate numbers of students enrolled in the programs, and (c) the students in the programs had to be available for testing purposes. Because of the length of the total GVC test (600 items), each student was administered only half of the test (two out of four booklets), and students were paired in order to obtain complete sets of item responses. (The pairing procedure is discussed later in this section,

under Ability Measures.) A total of 641 complete sets of item responses were thus obtained. Appendix A lists the 29 vocational/technical programs and related occupational titles, and indicates the number of cases (i.e., complete sets of item responses) obtained from each program. A list of the participating technical institutes and community colleges is also presented in Appendix A.

General Aptitude Test Battery sample. In the previous study by Bates and Cunningham (in press), aptitude test data were obtained for 291 occupations from the Manual for the General Aptitude Test Battery, Section III: Development (U. S. Department of Labor, 1967). The occupations selected from the GATB Manual were those for which adequate job descriptions (U. S. Employment Service job schedules) could be obtained from the files of the Occupational Analysis Field Center, Raleigh, North Carolina.¹ Because the obtained sample contained an excess of blue-collar occupations in relation to the numbers of people employed in the major occupational categories of the Bureau of Labor Statistics (U. S. Department of Labor, 1971), Bates and Cunningham randomly removed occupations from selected DOT categories, reducing the sample to 195 occupations. The present study used the reduced occupational sample. Appendix B lists the occupational titles and DOT code numbers in the

¹Although occupational titles were selected, written descriptions were obtained for specific jobs with the same titles and DOT code numbers as the occupations. For purposes of the Ergometric Project, an "occupation" is defined as a set of similar jobs across different establishments, while a "job" is defined as a set of similar positions existing within the same establishment (Cunningham, 1971). In this study, the test data were based on several jobs within each selected occupation, while the OAI data were based on individual jobs representing those occupations.

reduced sample, and shows the numbers and percentages of occupations in both the original and reduced samples by DOT and Labor Statistics categories. The GATB data consisted of the mean ability scores of incumbents in the 195 occupations. A more detailed description of those data is presented later in this section of the report (under Ability Measures).

OAI Work-Dimension Scores and Ability-Requirement
Estimates: Predictor Variables

As indicated previously, the Bates and Cunningham study used OAI work dimensions derived by Riccobono and Cunningham (1971b) and OAI ability-requirement weights derived by Neeb et al. (1971), while the present study used more recently developed work dimensions (Boese and Cunningham, 1975) and ability-requirement weights (Pass and Cunningham, 1975a). The revised OAI variables are described below.

OAI work-dimension scores for jobs. The work dimensions (factors) derived in the previously described Boese and Cunningham study included 132 first-order and 28 higher-order factors representing various kinds of work activities and conditions. Since jobs (USES job descriptions) corresponding to the 195 occupational titles in the reduced GATB sample were included in Boese and Cunningham's study, OAI work-dimension (factor) scores were available for all of the titles. Those scores were used in determining the relationships between the OAI work-dimension scores for jobs and the mean GATB scores of job incumbents (Hypothesis 3).²

²One of the 28 higher-order factors was not included in this study because of its lack of clarity and its low stability.

Appendix C lists the titles of the first- and second-order work dimensions included in this study.

OAI ability-requirement estimates for jobs. In the Pass and Cunningham study, McCormick's job-component procedure was used to derive the estimated requirements of 1414 OAI-rated jobs for 103 defined human attributes in the cognitive, psychomotor, and affective domains. The job-component procedure, summarized in the Introduction of this report, is described in detail by Pass and Cunningham (1975b). Among the attributes for which job-requirement estimates were obtained were the eight abilities measured by the General Aptitude Test Battery (GATB) and eight general vocational capabilities (GVC's) measured by an item pool developed by Altman (1966). (The 16 abilities and GVC's are listed later in the report, under Ability Measures.) Since there were jobs in Pass and Cunningham's sample corresponding to all of the occupational titles included in the present study, requirement estimates were available for those titles on the 16 relevant abilities and general vocational capabilities. In addition to the requirement estimates on those 16 abilities, two additional ability-requirement estimates (for deductive and inductive reasoning) were included in the study. The ability-requirement estimates were used in determining the relationships predicted in Hypotheses 1 and 2, i.e., the relationships between the ability-requirement estimates for jobs and the mean GATB scores of job incumbents and GVC scores of graduate trainees in relevant vocational/technical education programs.

Ability Measures: Dependent Variables

Two sets of dependent variables were used in this study: (a) the general vocational capability (GVC) test scores of students nearing completion of 29 different post-secondary vocational/technical education programs and (b) the mean General Aptitude Test Battery (GATB) scores of incumbents in 195 occupations.

General vocational capability scores. The GVC scores were based on an item pool developed by Altman (1966) at the American Institutes for Research (AIR). The original pool contained 600 items assigned to 24 GVC categories which, in turn, were subsumed under six broad GVC areas. Table 1 lists the 24 GVC categories under their respective areas. When Bates and Cunningham obtained copies of the 600 GVC items (generously provided by AIR), the assignments of the items to the 24 GVC categories were not recorded. Thus, seven judges were asked to sort the 600 items into the 24 GVC categories, and 571 items were retained which were assigned to the same category by five or more of the judges. The surviving pool of 571 items was further reduced to 522 through the elimination of two of the 24 GVC categories (as recommended by Altman): Computing (31 items) and Garment Equipment Operations (18 items). (Although not included in the dependent variable data, the Computing category was used as a covariate in the present study.) Based on the desired level of specificity of GVC measurement and the need for adequate numbers of items in the GVC tests, Bates and Cunningham treated the GVC areas as tests and summed the items within each area to obtain test scores; however, they expanded the original six areas into eight by splitting the Chemical-Biological and People areas into Chemical,

Table 1
General Vocational Capability Areas and Categories as
Defined by Altman (1966)

Areas	Categories Within Areas
MECHANICAL	Tools Mechanical Systems Measurement and Measuring Instruments Stationary Equipment Operation Vehicular Operation Connections and Fittings Fluid Systems Garment Equipment Operations ^a
ELECTRICAL	Electricity
SPATIAL	Layout and Visualization Structures
CHEMICAL-BIOLOGICAL	Materials Chemicals Foods and Cooking Biological Systems Medical and First Aid
SYMBOLIC	Arithmetic Conventions Clerical Computation ^b
PEOPLE	Sales Dealing with Situations Serving Etiquette Style and Grooming

^aThis category of items was later eliminated.

^bThis category of items was eliminated from the GVC scores but was used as a covariate in the present study.

Biological, People, and Style and Grooming. Table 2 lists the eight GVC test areas and indicates the number of items in each area.

The present study used the test data collected by Bates and Cunningham. Although Bates and Cunningham did not use all of the original GVC items, the entire pool of 600 items was administered, since the items had already been assembled into four booklets (A, B, C, and D) by the American Institutes for Research. Each of the eight GVC areas was represented in each booklet. Because of the large number of items involved, only two booklets were administered to each student; the booklets were administered in all six possible pairs (i.e., A-B, A-C, A-D, B-C, B-D, and C-D). Complete test scores for the eight GVC areas were obtained by combining the item responses of pairs of students who completed complementary booklets (e.g., a student who completed Booklets A and C might be paired with a student who completed Booklets B and D). A total of 641 cases (complete sets of item responses) was obtained by pairing students of the same sex within vocational/technical programs based on similarities in their basic aptitude test scores. The number of cases obtained from each of the 29 vocational/technical programs is indicated in Appendix A (Table 8).

General Aptitude Test Battery scores. As noted previously, the mean GATB scores for 195 occupations also served as dependent variable data in this study. Those scores, published in the Manual for the General Aptitude Test Battery, Section III (U. S. Department of Labor, 1967), are based on representative samples of incumbents employed in jobs related to the 195 occupational titles. Mean scores were available for each occupation on eight GATB abilities: Verbal (V), Numerical (N), Spatial (S),

Table 2
Numbers of Items in the Eight GVC Area Tests

GVC Tests	Number of Items
Mechanical	193
Electrical	34
Spatial	42
Chemical	31
Biological	62
Symbolic	57
People	81
Style and Grooming	<u>22</u>
TOTAL	522

Form Perception (P), Clerical Perception (Q), Motor Coordination (K), Finger Dexterity (F), and Manual Dexterity (M).

Analyses and Results

The analyses and results are described under the three hypotheses that were tested.

Hypothesis 1

Hypothesis 1 stated that there would be positive correlations between the OAI requirement estimates for jobs on eight general vocational capabilities (GVC's) and the mean GVC test scores of graduate trainees in vocational/technical programs related to the jobs.

Accordingly, the eight GVC-requirement estimates for 29 jobs were correlated with the mean GVC test scores of students nearing completion of 29 post-secondary vocational/technical programs related to those jobs.

Table 3 presents the resultant correlations. The first column of figures in Table 3 contains the Pearson correlations between the OAI job-requirement estimates for eight GVC's and the mean scores of graduate trainees on eight corresponding GVC tests. As shown, six of those correlations are significant ($p < .01$).

It seemed possible, however, that academic ability might inflate the correlations in some instances and attenuate them in others, since Altman (1966) had found that his GVC tests correlated significantly with linguistic and quantitative ability tests such as the Science Research Associates (SRA) Verbal test of general intelligence (Thurstone and Thurstone, 1947). Thus, in some instances academic ability might account for part or all of an obtained correlation between GVC-requirement estimates and mean GVC test scores, while in other cases academic ability might suppress or counteract the correlation. For that reason, a measure of academic ability was partialled from the correlations between the GVC-requirement estimates and the mean GVC test scores. Altman's Computation subtest (see Table 1) was used as the measure of academic ability, based on its correlations with three basic aptitude tests.³ As indicated previously, the Computation subtest was included among the 600 items administered by Bates and Cunningham, but its items were not

³Altman (1966) reported correlations of .54 and .61 between Computation and the linguistic and quantitative scores of the SRA Verbal test of general intelligence; Bates and Cunningham obtained correlations of .54 and .53 between Computation and the GATB-G and the Otis Quick-Scoring Test of Mental Maturity.

Table 3

Correlations Between the Estimated GVC Requirements of 29 Jobs
and the Mean GVC Test Scores of Graduate Trainees in 29
Related Vocational/Technical Programs

GVC	r_{12}^a	$r_{1(2\cdot3)}^{b,c}$	$r_{12\cdot3}^{b,d}$
Mechanical	.30	.59*	.61*
Electrical	.53*	.70*	.70*
Spatial	.58*	.68*	.70*
Chemical	-.08	.13	.13
Biological	.57*	.86*	.88*
Symbolic	.80*	.46*	.61*
People	.46*	.76*	.77*
Style and Grooming	.73*	.74*	.76*

* $p < .01$

^adf = 27

^bdf = 26

^cSemi-partial correlation: academic ability scores were partialled from the mean GVC test scores.

^dPartial correlation: academic ability scores were partialled from the mean GVC test scores and the estimated GVC requirements.

included in the eight GVC test scores. The mean Computation score was determined for each of the 29 vocational/technical programs, and those means comprised the covariate in the computation of partial and semi-partial correlations between the GVC-requirement estimates for jobs and the mean GVC test scores for programs. In the semi-partial correlations, Computation was partialled out of the mean GVC test scores only.

The second and third columns in Table 3 contain the semi-partial and partial correlations, respectively. It can be seen that for five GVC's (Mechanical, Electrical, Spatial, Biological, and People), removing the Computation test variance from the GVC test scores increased the correlation appreciably, while for one GVC (Symbolic) it reduced the correlation; for the two remaining GVC's, partialing had little effect. Since there is little difference between the partial and semi-partial correlations, it can be assumed that academic ability (as measured by the Computation subtest) affected the correlations between GVC-requirement estimates and GVC test scores through its covariance with the GVC tests.

Hypothesis 2

Hypothesis 2 stated that there would be positive correlations between the OAI requirement estimates for jobs on 10 basic cognitive and psychomotor abilities and the mean scores of job incumbents on the eight ability measures in the General Aptitude Test Battery (GATB). The analyses for this hypothesis included the previously described mean GATB scores of job incumbents in 195 occupations and OAI ability-requirement

estimates for 195 matching jobs.⁴ The OAI job-requirement estimates for each of 10 defined abilities were correlated with mean scores on corresponding GATB abilities; 8 of the 10 requirement estimates corresponded directly with the 8 GATB abilities, while the remaining 2 estimates (Deductive and Inductive Reasoning) were related but not directly correspondent to selected GATB abilities.

As shown in Table 4, 9 out of 12 correlations were statistically significant ($p < .01$). The first column of figures in Table 4 contains the correlations from the present study, and the second column contains the correlations obtained by Bates and Cunningham. All of the correlations involving cognitive abilities were significant, while none of the correlations for psychomotor abilities was significant. It can be seen that the correlations from the present study tend toward slightly lower values than those obtained by Bates and Cunningham, although the results from the two studies are in very close agreement. Appendix D presents the correlations between each of the 10 OAI ability requirements and the mean scores on all eight GATB abilities.

Hypothesis 3

Hypothesis 3 stated that the OAI work-dimension (factor) scores for jobs would predict (through multiple correlation) the mean scores of job incumbents on the eight ability measures in the General Aptitude Test Battery. Both first- and higher-order OAI work dimensions were used

⁴As indicated previously, the ability-requirement estimates were based on the OAI ratings of USES descriptions (job schedules) of specific jobs having the same titles and DOT codes as the 195 selected occupational titles (i.e., the titles for which mean GATB scores of job incumbents were available).

Table 4

Correlations Between the OAI Ability-Requirement Estimates
for 195 Jobs and the Corresponding Mean GATB
Scores of Job Incumbents

Ability-Requirement Estimates	GATB Scales	$r:P^a$	$r:B^b$
Verbal Comprehension	Verbal Aptitude	.70*	.72*
Inductive Reasoning		.69*	.72*
Deductive Reasoning		.69*	.70*
Number Facility	Numerical Aptitude	.66*	.66*
Inductive Reasoning		.66*	.67*
Deductive Reasoning		.65*	.66*
Visualization	Spatial Aptitude	.47*	.52*
Form Perception	Form Perception	.17*	.15
Perceptual Speed	Clerical Perception	.57*	.59*
Eye-Hand Coordination	Motor Coordination	-.23	-.21
Finger Dexterity	Finger Dexterity	.11	.13
Manual Dexterity	Manual Dexterity	.07	.09

* $p < .01$; one-tailed test.

^aCorrelations obtained in the present study.

^bCorrelations obtained in a study by Bates and Cunningham (in press).

in testing this hypothesis (see Appendix C for the work-dimension titles). The same sample of 195 occupational titles and the same GATB data involved in the analyses for Hypothesis 2 were used in testing Hypothesis 3.

In the Bates and Cunningham study, a sample of 286 occupational titles was divided into two equal subsamples for cross-validation purposes. The subsamples were formed by random selection of occupations from each of the nine first-digit DOT categories shown in Appendix B (Table 9), such that the resultant subsamples contained approximately equal numbers of occupations from each DOT category. However, when the original sample of 286 occupations was reduced to 195, as described earlier, the original subsamples containing 143 occupations each were disproportionately reduced: one of the reduced subsamples contained 94 occupations and the other 101 occupations. The reduced subsamples were used for cross-validation purposes in the present study.

Multiple correlations were computed in which the first- and higher-order work dimensions served as predictors and the GATB scores as dependent variables. For both sets of work dimensions (i.e., first- and higher-order), a separate multiple correlation was computed with each of the eight GATB ability measures; that is, eight multiple correlations were computed for each set of work dimensions, one with each GATB measure. For the higher-order work dimensions, the eight multiple correlation analyses were performed by four different procedures under the Statistical Analysis System (Service, Barr, and Goodnight, 1972):

- (1) The Multiple Linear Regression Procedure (Regr Procedure), including the 10 higher-order work dimensions having the highest bivariate correlations with the criterion variable.

(2) The Forward Stepwise Selection Procedure, including all 27 higher-order work dimensions and requiring a .10 "significance level of entry" into the model (SLE, the probability of the F statistic which reflects a variable's contribution to the model).

(3) The Forward Stepwise Selection Procedure, including the 10 higher-order work dimensions having the highest bivariate correlations with the criterion variable and requiring a .10 significance level for entry (SLE).

(4) The Stepwise Procedure (a modification of the Forward Procedure), including all 27 higher-order work dimensions and requiring a .10 SLE and a .05 "significance level for staying in" (SLS). Under the Stepwise Procedure, the method and criterion for adding variables to the model are the same as in the Forward Procedure, but after ". . . a variable is added . . . STEPWISE looks at all the variables already included in the model, [and any] variable not producing a partial F-statistic significant at the specified 'significance level for staying in' is then deleted from the model" (Service et al., 1972, pp. 127-128).

The eight multiple correlations involving the first-order work dimensions were computed by the two following procedures:

(1) The Forward Stepwise Selection Procedure, including all 132 first-order work dimensions and requiring a SLE of .10.

(2) The Stepwise Procedure, also including all 132 first-order work dimensions. The required SLE under this procedure was .10, and the required SLS was .05.

Under procedures (2) and (4) for the higher-order factors and both procedures for the first-order factors, a limit of 15 was placed on the number of factors retained in the regression model.

Each of the multiple correlation analyses described above was applied separately to the total sample of 195 occupations and to each of the two subsamples. Under a double cross-validation design, the regression coefficients from each subsample were then applied to the opposite subsample, and cross-validated correlation coefficients were computed. Table 5 presents the multiple and cross-validated correlations obtained under the second procedure (Forward Selection) for the higher-order work dimensions, and Table 6 presents the correlations obtained under the second procedure (Stepwise) for the first-order work dimensions. The results under the remaining procedures are presented in Appendix E. Table 7 summarizes the cross-validation results obtained under six analytic procedures in the present study and two procedures in the Bates and Cunningham study.

Of the 16 cross-validated correlations presented in Table 5, 14 are statistically significant; the values range from .77 to .10. The same number of cross-validated correlations in Table 6 are statistically significant, but the values are somewhat lower, ranging from .68 to .14. In Table 7 it can be seen that the cross-validated correlations based on the higher-order work dimensions tend toward higher values than those based on the first-order work dimensions. For the higher-order work dimensions, the Forward Stepwise Selection Procedure including all 27 dimensions generally produced the highest cross-validated correlations. Interestingly, the analyses performed by Bates and Cunningham

Table 5

Multiple and Cross-Validated Correlations Between the OAI Higher-Order
Work-Dimension Scores for Jobs and the Mean GATB Scores of Job
Incumbents: Forward Stepwise Selection Procedure Including
27 Higher-Order Work Dimensions

GATB Tests	Multiple Correlations ^a			Cross-Validated Correlations	
	Total Sample (n=195)	Sub- sample 1 (n=94)	Sub- sample 2 (n=101)	Subsample 1 to Subsample 2	Subsample 2 to Subsample 1
Verbal Aptitude (V)	.83**(15)	.89**(15)	.80**(13)	.71**	.77**
Numerical Aptitude (N)	.77**(15)	.80**(12)	.70**(8)	.66**	.50**
Spatial Aptitude (S)	.72**(15)	.80**(12)	.75**(13)	.59**	.52**
Form Perception (P)	.63**(12)	.70**(10)	.62**(8)	.44**	.43**
Clerical Perception (Q)	.75**(15)	.79**(13)	.76**(11)	.61**	.62**
Motor Coordination (K)	.45**(12)	.70**(10)	.70**(10)	.53**	.50**
Finger Dexterity (F)	.53**(10)	.61**(11)	.60**(7)	.20*	.29**
Manual Dexterity (M)	.36**(6)	.42**(5)	.35**(3)	.18	.10

^aThe parenthesized numbers to the right of the correlation coefficients represent the number of work dimensions retained in the regression model. A limit of 15 was set on the number of work dimensions retained.

*p < .05

**p < .01

Table 6

Multiple and Cross-Validated Correlations Between the OAI First-Order Work-Dimension Scores for Jobs and Mean GATB Scores of Job Incumbents: Stepwise Procedure Including 132 First-Order Work Dimensions

GATB Tests	Multiple Correlations ^a			Cross-Validated Correlations	
	Total Sample (n=195)	Sub-sample 1 (n=94)	Sub-sample 2 (n=101)	Subsample 1 to Subsample 2	Subsample 2 to Subsample 1
Verbal Aptitude (V)	.87**(15)	.94**(15)	.90**(11)	.64**	.68**
Numerical Aptitude (N)	.78**(9)	.90**(15)	.85**(11)	.65**	.50**
Spatial Aptitude (S)	.77**(12)	.82**(11)	.81**(10)	.55**	.35**
Form Perception (P)	.69**(12)	.81**(10)	.73**(8)	.34**	.44**
Clerical Perception (Q)	.77**(11)	.85**(13)	.86**(13)	.55**	.47**
Motor Coordination (K)	.70**(10)	.83**(13)	.72**(6)	.36**	.48**
Finger Dexterity (F)	.60**(11)	.72**(8)	.65**(6)	.23*	.28**
Manual Dexterity (M)	.49**(7)	.76**(12)	.35**(2)	.17	.14

^aThe parenthesized numbers to the right of the correlation coefficients represent the number of work dimensions retained in the regression model. A limit of 15 was set on the number of work dimensions retained.

*p < .05

**p < .01

Table 7

Cross-Validated Multiple Correlations Between OAI Work-Dimension Scores and Mean GATB Scores, Based on Six Procedures in the Present Study and Two Procedures in the Bates and Cunningham Study

Predictors (OAI Work Dimensions and Procedures ^{a, b})	Dependent Variables (GATB Measures)							
<u>Subsample 1 to Subsample 2</u>								
<u>Present Study</u>	<u>V</u>	<u>N</u>	<u>S</u>	<u>P</u>	<u>Q</u>	<u>K</u>	<u>F</u>	<u>M</u>
Higher-order WD's, Multiple Regression (10)	.65	.61	.55	.44	.66	.58	.27	.23
Higher-order WD's, Forward (27)	.71	.66	.59	.44	.61	.53	.20	.18
Higher-order WD's, Forward (10)	.63	.58	.47	.32	.62	.56	.18	.12
Higher-order WD's, Stepwise (27)	.71	.62	.59	.44	.63	.54	-.13	.01
First-order WD's, Forward (132)	.67	.65	.55	.28	.61	.37	.25	.18
First-order WD's, Stepwise (132)	.64	.65	.55	.34	.55	.36	.23	.17
<u>Bates and Cunningham Study</u>								
Higher-order WD's (22)	.74	.68	.62	.50	.67	.52	.30	.23
First-order WD's (90)	.75	.65	.56	.51	.64	.47	.19	.18
<u>Subsample 2 to Subsample 1</u>								
<u>Present Study</u>	<u>V</u>	<u>N</u>	<u>S</u>	<u>P</u>	<u>Q</u>	<u>K</u>	<u>F</u>	<u>M</u>
Higher-order WD's, Multiple Regression (10)	.72	.59	.44	.30	.63	.55	.31	.17
Higher-order WD's, Forward (27)	.77	.50	.52	.43	.62	.50	.29	.10
Higher-order WD's, Forward (10)	.68	.62	.50	.46	.66	.45	.26	.11
Higher-order WD's, Stepwise (27)	.73	.48	.36	.40	.65	.51	.29	.11
First-order WD's, Forward (132)	.66	.55	.35	.28	.51	.29	.33	.12
First-order WD's, Stepwise (132)	.68	.50	.35	.44	.47	.48	.28	.14

Table 7 (continued)

Predictors (OAI Work Dimensions) and Procedures ^{a,b}	Dependent Variables (GATB Measures)							
<u>Bates and Cunningham Study</u>	<u>V</u>	<u>N</u>	<u>S</u>	<u>P</u>	<u>Q</u>	<u>K</u>	<u>F</u>	<u>M</u>
Higher-order WD's (22)	.77	.75	.65	.50	.55	.53	.37	.32
First-order WD's (90)	.71	.57	.46	.38	.62	.57	.26	.12

^aThe procedures are described in the text.

^bThe numbers in parentheses indicate the numbers of work dimensions included in the different multiple correlation analyses.

using the OAI work dimensions derived by Riccobono and Cunningham (1971b) produced somewhat higher cross-validated correlations than the analyses in the present study, which used Boese and Cunningham (1975) OAI work dimensions.

DISCUSSION AND CONCLUSIONS

This study was designed to determine the relationships between the revised OAI work-dimension scores and ability-requirement estimates for jobs and the ability test scores of job incumbents and graduate trainees in related vocational/technical education programs. Using the revised set of OAI job variables as predictors, the study essentially retested some of the hypotheses tested previously by Bates and Cunningham (in press). The dependent variable data in this study were the same as those used by Bates and Cunningham: the General Aptitude Test Battery (GATB) scores of job incumbents and the general vocational capability (GVC) test scores of students nearing completion of relevant post-secondary vocational/technical education programs.

The results are discussed in relation to the three hypotheses tested.

Hypothesis 1

Hypothesis 1 stated that there would be positive correlations between the OAI requirement estimates for jobs on eight general vocational capabilities (GVC's) and the mean GVC test scores of graduate trainees in vocational/technical programs related to the jobs. It was assumed under this hypothesis that the mean GVC test score profiles of graduate trainees in the various occupational programs would equal or exceed the requirements of the relevant occupations (i.e., the occupations represented by the OAI-rated jobs) and therefore reflect the GVC requirements of those occupations.

Of the eight correlations computed, six were statistically significant. However, when academic ability (as measured by the Computation subtest) was held constant by partialing that variable from the GVC test scores, six of the resultant semi-partial correlations showed a considerable increase over the original (unpartialled) correlations, while one semi-partial correlation (for the Symbolic GVC) showed a marked decrease; seven of the eight semi-partial correlations were statistically significant. Based on those results, it would appear that academic ability suppressed the correlations between the OAI estimates and GVC test scores in six cases, but accounted for part of the correlation in the case of the Symbolic GVC. The latter finding is not surprising, since the Computation subtest was originally assigned to the Symbolic GVC area (see Table 1). As shown in Table 3, partialing academic ability from both the OAI job-requirement estimates and the GVC tests changed the correlations only slightly from those obtained through the semi-partialing procedure.

Thus, the results supported Hypothesis 1 in seven out of eight analyses. Although Bates and Cunningham also found seven significant relationships between OAI job-requirement estimates and GVC test scores, the extent of the relationships cannot be compared with those in the present study, since Bates and Cunningham used an analysis-of-variance procedure rather than correlation.

Hypothesis 2

Hypothesis 2 stated that there would be positive correlations between the OAI requirement estimates for jobs on 10 basic cognitive

and psychomotor abilities and the mean scores of job incumbents on the eight ability measures in the General Aptitude Test Battery. This hypothesis assumed that (a) people tend to gravitate to and remain in jobs whose requirements are reasonably compatible with their abilities, and (b) the mean ability test scores of representative samples of job incumbents should, therefore, reflect the ability requirements of their jobs.

Of the 12 predicted correlations, 9 were statistically significant. All of the correlations involving cognitive abilities were significant (although the correlation for Form Perception was very low), while none involving psychomotor abilities was significant. Thus, Hypothesis 2 was supported for the cognitive abilities only.

Although it had been expected that the correlations in this study would be somewhat higher than those obtained by Bates and Cunningham, the results of the two studies were very similar, with a slight tendency toward lower correlations in the present study. From that comparison, it must be assumed that the revised ability-requirement weights for the OAI work elements (Pass and Cunningham, 1975a), though more reliable than the original weights (Neeb, Cunningham, and Pass, 1971), did not increase the validity of the OAI ability-requirement estimates for jobs.

The correlations obtained under Hypothesis 2 in the present study are somewhat higher than those obtained by Mecham and McCormick (1969) for comparable ability-requirement estimates derived from the Position Analysis Questionnaire (PAQ). The correlations in Table 4

range from .70 to -.21 with a median of .61, while roughly comparable correlations for the PAQ ranged from .74 to -.24 with a median of .41.⁵

Hypothesis 3

Hypothesis 3 stated that the OAI work-dimension (factor) scores for jobs would predict (through multiple correlation) the mean scores of job incumbents on the eight ability measures in the General Aptitude Test Battery. It was reasoned in this hypothesis that if the OAI work dimensions were meaningful in terms of work-related human behavior, they should correlate with the behavioral potentials of job incumbents as measured by the GATB. The same assumption underlying Hypothesis 2 also applied to Hypothesis 3.

As shown in Tables 5 and 6 and in Appendix E, the cross-validated multiple correlations were statistically significant for seven of the eight GATB abilities. The cross-validated correlations for Manual Dexterity were not significant, and with the exception of Form Perception, the correlations were higher for the cognitive abilities than for the psychomotor abilities. In Table 7, it can be seen that the cross-validated correlations based on the higher-order work dimensions tend

⁵For this comparison, the PAQ figures are based only on selected PAQ ability requirements that seemed comparable to the OAI ability requirements listed in Table 4. The 12 correlations between the following PAQ ability requirements and related GATB measures (symbolized in parentheses) were included in those figures: Verbal Comprehension (V), Numerical Computation (N), Arithmetic Reasoning (N), Convergent Thinking (V and N), Intelligence (V and N), Form Perception (P), Perceptual Speed (Q), Spatial Visualization (S), Manual Dexterity (M), and Eye-Hand Coordination (K) (Mecham and McCormick, 1969, Table 2). The figures cited for the PAQ do not include correlations between the PAQ ability requirements and the GATB-G (some of which were substantial), since comparable correlations were not computed for the OAI.

toward higher values than those based on the first-order work dimensions, and the correlations obtained by Bates and Cunningham are somewhat higher than those in the present study.

As with the revised OAI ability-requirement estimates, it was expected that the revised OAI work dimensions used in the present study, because of their higher stability, would show somewhat higher correlations with GATB scores than the original work dimensions used by Bates and Cunningham. Why the results did not support that expectation can only be speculated. It is possible that because the revised OAI dimensions (Boese and Cunningham, 1975) are somewhat more specific and content oriented than those derived originally by Riccobono and Cunningham (1971b), the revised dimensions do not have as much variance to share with the GATB as the original dimensions. That speculation is consistent with (a) the generally lower cross-validated correlations obtained with the first-order (more specific) OAI work dimensions in comparison to those for the higher-order dimensions, and (b) the generally higher cross-validated correlations obtained by Mecham and McCormick (1969) between the PAQ (Position Analysis Questionnaire) work-dimension scores for jobs and the GATB scores of job incumbents.⁶ In regard to the latter comparison, it should be noted that the PAQ dimensions were derived from "worker-oriented" elements, while the

⁶The cross-validated correlations for the higher-order OAI work dimensions ranged from .77 to .10, with a median value of .51 (Table 5), while the corresponding correlations for the PAQ dimensions ranged from .80 to .39, with a median of .64 (Mecham and McCormick, 1969, Table 4). The correlations of the PAQ dimensions with the GATB-G were excluded from the preceding figures, since the OAI dimensions were not correlated with G.

OAI dimensions were derived from more content-loaded, or "job-oriented," elements (McCormick, 1964). It would thus appear that the PAQ's emphasis on more basic, general activities produced work dimensions that are more reflective of jobs' basic aptitude requirements than the OAI dimensions. Although that possibility was anticipated during the development of the OAI, the use of content-loaded elements was considered necessary in the development of a taxonomic framework applicable to occupational guidance and education (Cunningham et al., 1971).

General Conclusions

The results of this study offer general support for the construct validity of the OAI work-dimension scores and ability-requirement estimates for jobs. Of the eight relationships predicted under Hypothesis 1, seven were statistically significant; of the twelve relationships predicted under Hypothesis 2, nine were statistically significant; and of the eight relationships predicted under Hypothesis 3, seven were supported by statistically significant cross-validated correlations. As noted, however, the OAI variables showed considerably stronger relationships with measured cognitive abilities than with psychomotor abilities. Although the higher-order work dimensions were significantly correlated with two of the three GATB psychomotor abilities (see Table 5), those correlations were relatively low. Moreover, none of the correlations between the OAI ability-requirement estimates and GATB psychomotor abilities was statistically significant.

Based on the results obtained in this study and the study conducted by Bates and Cunningham, it can be concluded that the OAI

work-dimension scores and ability-requirement estimates for jobs possess demonstrated relevance to the measured abilities of job incumbents and graduate trainees in job-related vocational/technical education programs. This support for the validity of the OAI variables contributes, in turn, to the credibility of the OAI-based occupational cluster structure derived by Pass and Cunningham (1975b). The OAI variables should prove useful in research dealing with work-related characteristics and behavior and development in the fields of occupational education and guidance.

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APPENDICES

APPENDIX A**SAMPLE AND MEAN TEST SCORES FOR THE
GENERAL VOCATIONAL CAPABILITY DATA**

- A. List of Occupational Titles and
DOT Numbers
- B. Mean General Vocational Capability
Test Scores for Each Vocational/
Technical Program
- C. Participating Technical Institutes
and Community Colleges

A. List of Occupational Titles and DOT Code
Numbers in the GVC Sample

<u>Title</u>	<u>DOT Code</u>
1. Accounting Clerk (clerical)	219.488
2. Automobile Body Repairman (auto service)	807.381
3. Automobile Mechanic (auto service)	620.281
4. Bricklayer (construction)	861.381
5. Building Designer (professional and kindred)	001.081
6. Carpenter (construction)	860.381
7. Cosmetologist (personal service)	332.271
8. Dental Assistant (medical service)	079.378
9. Diesel Mechanic (any industry)	625.281
10. Draftsman, Detail (professional and kindred)	017.281
11. Draftsman, Mechanical (professional and kindred)	007.281
12. Electrician (any industry)	824.281
13. Electronics Mechanic (any industry)	828.281
14. Engineering Aide II (professional and kindred)	019.281
15. General Manager, Farm (agriculture; wholesale trade)	180.168
16. General Office Clerk (clerical)	219.388
17. Illustrator (professional and kindred)	141.081
18. Industrial Engineering Technician (professional and kindred)	012.288
19. Machinist I (machine shop)	600.280
20. Nurse, General Duty (medical service)	075.378
21. Nurse, Licensed Practical (medical service)	079.378
22. Patrolman (government service)	375.268
23. Programmer, Business (professional and kindred)	021.188
24. Refrigeration Mechanic (any industry)	637.281
25. Secretary (clerical)	201.368
26. Surveyor (professional and kindred)	018.188
27. Television Service and Repairman (any industry)	720.281
28. Tool and Die Maker (machine shop)	601.280
29. Welder, Combination (welding)	812.884

(B)
Table 8

Mean GVC Test Scores for Each Vocational/Technical Program

Program	Number of Cases	General Vocational Capabilities ^a							
		Mechanical (193)	Electrical (34)	Spatial (42)	Chemical (31)	Biological (62)	Symbolic (57)	People (81)	Personal (22)
1. Accounting	10	117.70	19.80	23.50	17.50	37.00	40.80	49.50	9.40
2. Automobile Body Repair	17	106.12	17.29	19.76	13.35	25.53	21.63	33.76	9.00
3. Automobile Mechanics	48	115.71	18.85	18.40	14.15	27.90	23.04	33.42	9.19
4. Masonry	8	96.00	17.38	19.12	14.23	24.62	18.25	32.62	10.12
5. Architectural Technology	20	127.45	21.65	30.95	17.05	34.70	29.15	40.35	10.35
6. Carpentry	19	116.32	19.95	27.37	16.11	32.05	26.89	42.53	11.79
7. Cosmetology	34	88.68	16.71	18.76	13.71	35.12	26.59	42.68	17.38
8. Dental Assistant	18	82.67	17.11	19.89	16.22	39.06	32.17	46.83	15.17
9. Diesel Vehicle Maintenance	22	119.27	18.55	21.27	15.05	27.95	22.73	32.18	9.55
10. Mechanical Drafting	18	128.56	20.78	30.78	18.00	34.61	31.56	44.83	9.94
11. Mechanical Drafting and Design	17	142.06	23.65	33.12	19.47	38.12	34.88	47.82	11.35
12. Electrical Installation and Maintenance	23	128.00	25.78	22.26	17.00	33.96	27.09	40.35	9.65
13. Electronics Engineering Technology	24	131.96	25.46	26.12	18.29	35.21	31.25	42.67	10.46
14. Mechanical Engineering Technology	10	148.60	26.70	34.50	20.60	42.60	36.80	47.80	12.40
15. Agricultural Business	13	110.69	17.46	19.62	16.69	32.46	30.15	39.38	10.62
16. Business Administration	32	102.72	18.22	20.19	13.53	31.53	32.28	41.00	10.38
17. Commercial Art and Advertising Design	14	106.57	16.21	25.36	17.21	31.71	24.00	39.50	10.07
18. Industrial Engineering Technology	14	144.07	26.43	34.64	21.93	39.14	36.50	49.00	14.86
19. Machinist	22	126.18	19.55	24.55	16.73	31.82	25.55	37.95	10.05
20. Associate Degree Nursing	19	90.68	17.05	18.68	16.68	45.63	30.74	49.16	16.42
21. Practical Nursing	52	94.23	18.19	19.96	16.65	42.56	31.15	50.63	15.17
22. Police Science	16	132.56	23.19	25.63	19.12	37.31	32.69	48.12	13.69
23. Electronic Data Processing	14	127.50	23.14	27.21	17.36	38.93	40.29	46.50	11.36
24. Air Conditioning and Refrigeration Service	36	138.58	25.79	26.24	19.03	34.18	28.68	42.66	11.18
25. Secretarial--Executive	45	75.38	14.69	16.47	12.11	33.22	32.71	43.40	13.20
26. Civil Engineering Technology	13	140.69	21.46	32.85	20.85	40.38	38.08	51.00	12.00
27. Radio and Television Servicing	25	128.96	26.00	23.80	16.40	34.88	30.08	44.72	11.44
28. Tool and Die Making	20	144.15	24.35	31.40	19.25	37.15	31.45	44.70	11.40
29. Welding	16	114.25	19.56	21.94	16.44	30.56	24.19	37.19	10.19

^aThe numbers in parentheses indicate the number of items for the specified general vocational capability.

C. Participating Technical Institutes and
Community Colleges

Asheville-Buncombe Technical Institute (Asheville)
Beaufort County Technical Institute (Washington)
Bladen Technical Institute (Dublin)
Cape Fear Technical Institute (Wilmington)
Central Carolina Technical Institute (Sanford)
Central Piedmont Community College (Charlotte)
Cleveland County Technical Institute (Shelby)
Coastal Carolina Community College (Jacksonville)
Craven Technical Institute (New Bern)
Davidson County Community College (Lexington)
Fayetteville Technical Institute (Fayetteville)
Forsyth Technical Institute (Winston-Salem)
Gaston College (Dallas)
Guilford Technical Institute (Jamestown)
James Sprunt Institute (Kenansville)
Lenoir Community College (Kinston)
Martin Technical Institute (Williamston)
Nash Technical Institute (Rocky Mount)
Pitt Technical Institute (Greenville)
Randolph Technical Institute (Asheboro)
Richmond Technical Institute (Hamlet)
Roanoke-Chowan Technical Institute (Ahoskie)
Robeson Technical Institute (St. Pauls)
Sandhills Community College (Southern Pines)
Southeastern Community College (Whiteville)
Southwestern Technical Institute (Sylva)
Surry Community College (Dobson)
Technical Institute of Alamance (Burlington)
Tri-County Technical Institute (Murphy)
Wake Technical Institute (Raleigh)
Wayne Community College (Goldsboro)

Western Piedmont Community College (Morganton)

Wilkes Community College (Wilkesboro)

Wilson County Technical Institute (Wilson)

APPENDIX B

SAMPLE FOR THE GENERAL APTITUDE TEST BATTERY DATA

- A. Table 9: Numbers and Percentages of Occupations in the Original and Reduced GATB Samples by DOT and Labor Statistics Categories
- B. List of Occupational Titles and DOT Code Numbers in the Reduced GATB Sample

(A)

Table 9

Numbers and Percentages of Occupations in the Original and Reduced GATB Samples
by DOT and Labor Statistics Categories

1st Digit of DOT Code	DOT Category	Labor Statistics Category	Original Sample (n=286)	Reduced Sample (n=195)	Percentage of Reduced Sample	Percentage of Employed Population ^a
0,1	Professional, Technical, and Managerial Occupations	White-Collar Workers	50	50		
2	Clerical and Sales Occupations		36	36		
		TOTAL	86	86	44.1	48.3
3	Service Occupations . . .	Service Workers	23	23	11.8	12.4
4	Farming, fishery, forestry and related occupations . . .	Farm Workers	1	1	.5	3.9
5	Processing occupations		23	17		
6	Machine trades occupations	Blue-Collar Workers	58	17		
7	Bench work occupations		43	17		
8	Structural work occupations	TOTAL	23 147	17 68	34.9	35.3
9	Miscellaneous occupations	----	29	17	8.7	--

^aBased on data published by the U. S. Department of Labor, Bureau of Labor Statistics (1971). 5

(B)

1	0009	018.186	SURVEYOR (PROFES
2	0012	029.281	LABORATORY TESTE
3	0016	074.181	PHARMACIST (PROF
4	0017	075.378	NURSE, GENERAL D
5	0019	079.178	PHYSICAL THERAPI
6	0041	185.168	MANAGER, STORE (
7	0046	189.118	MANAGER, INDUSTR
8	0054	210.388	BOOKKEEPING-MACH
9	0057	216.488	CALCULATING-MACH
0	0063	223.397	STOCK CLERK (CLE
1	0080	313.381	COOK (HOTEL & RE
2	0082	316.884	MEAT CUTTER (WHO
3	0088	355.878	NURSE AIDE (MEDI
4	0159	557.782	EXTRUDER OPERATO
5	0165	559.782	CHEMICAL OPEATOR
6	0189	589.885	BOARDING-MACHINE
7	0194	601.280	TOOL-AND-DIE MAK
8	0211	620.281	AUTOMOBILE MECHA
9	0223	653.782	FOLDING-MACHINE
0	0227	661.281	PATTERNMAKER, WO
1	0281	726.884	BOAT LOADER (ELE
2	0282	726.884	SEMICONDUCTOR AS
3	0339	801.381	AIRCRAFT MECHANI
4	0340	804.281	SHEET-METAL WORK
5	0353	840.781	PAINTER, MAINTEN
6	0357	859.883	OPERATING ENGINE
7	0379	921.683	FORK-LIFT-TRUCK
8	0390	950.782	STATIONARY ENGIN
9	0402	003.181	ELECTRONIC TECHN
0	0404	001.281	DRAFTSMAN, MECHA
1	0406	008.081	CHEMICAL ENGINEE
2	0407	011.281	METALLURGICAL TE
3	0410	012.168	SYSTEMS ANALYST,
4	0412	019.281	ENGINEERING AID
5	0413	020.088	MATHEMATICIAN
6	0414	020.188	PROGRAMMER, BUSI
7	0415	020.188	PROGRAMMER, ENGI
8	0416	040.188	FORESTER
9	0417	041.081	BIOLOGIST
0	0418	045.088	PSYCHOLOGIST
1	0419	054.088	SOCIOLOGIST
2	0420	070.108	GENERAL PRACTITI
3	0421	072.108	DENTIST
4	0422	073.108	VETERINARIAN
5	0423	077.168	DIETITIAN
6	0424	078.368	DENTAL HYGIENIST
7	0425	078.368	RADIOLOGIC TECHN
8	0426	078.381	MEDICAL LABORATO
9	0427	078.381	MEDICAL TECHNOLO
0	0428	079.128	OCCUPATIONAL THE
1	0429	079.368	OCCUPATIONAL THE
2	0430	079.368	PSYCHIATRIC TECH
3	0431	079.368	INHALATION THERA
4	0432	079.368	MEDICAL ASSISTAN
5	0433	079.378	NURSE, LICENSED
6	0434	079.378	SURGICAL TECHNIC
7	0435	079.378	DENTAL ASSISTANT
8	0436	091.228	TEACHER, SECONDA
9	0437	100.166	HEAD CATALOG LIB
0	0438	142.981	CLOTHES DESIGNER

61	439	0439	159.228	CAMP COUNSELOR
62	440	0440	163.118	MANAGER, CITY CI
63	441	0441	166.088	JOB ANALYST
64	442	0442	168.268	CREDIT MAN
65	443	0443	169.188	UNDERWRITER (INS
66	445	0445	185.168	PROPRIETOR-MANAG
67	446	0446	185.168	MANAGER, RETAIL
68	447	0447	338.381	EMBAIMER
69	448	0448	187.168	MANAGER, CAFETER
70	449	0449	187.148	MANAGER, THEATER
71	450	0450	193.168	AIR-TRAFFIC CONT
72	451	0451	195.108	CASH WORKER
73	452	0452	202.388	STENOGRAPHER
74	453	0453	205.368	EMPLOYMENT CLERK
75	454	0454	206.388	FILE CLERK II (N
76	455	0455	207.782	OFFSET-DUPICATI
77	456	0456	208.588	TYPESETTER-PERFO
78	457	0457	209.588	ENCODER
79	458	0458	209.688	CHECKER II
80	459	0459	209.688	PROOFREADER I
81	460	0460	210.388	AUDIT CLERK
82	461	0461	210.388	BOOKKEEPER I
83	462	0462	212.368	TELLER
84	463	0463	213.382	DIGITAL-COMPUTER
85	464	0464	213.582	KEY PUNCH OPERAT
86	465	0465	213.782	TABULATING-MACHI
87	466	0466	217.388	PROOF-MACHINE OP
88	468	0468	219.388	WARD CLERK (MEDI
89	469	0469	219.878	FOUNTAIN GIRL
90	470	0470	220.168	MATERIAL COORDIN
91	472	0472	224.487	WEIGHING-STATION
92	474	0474	234.782	MAILING-MACHINE
93	475	0475	235.782	TELEPHONE OPERAT
94	476	0476	235.862	TELEPHONE ANSWER
95	477	0477	241.168	CLAIMS ADJUSTER
96	478	0478	242.368	HOTEL CLERK
97	479	0479	250.358	SALESMAN, REAL E
98	480	0480	276.358	SALESMAN, CONSTR
99	481	0481	289.358	SALESPERSON, AUT
100	482	0482	289.458	SALESPERSON, GEN
101	483	0483	290.478	SALES CLERK
102	484	0484	292.358	BAKERY-WAGON DRI
103	485	0485	292.358	ROUTE MAN, RETAIL
104	486	0486	292.358	ROUTE MAN, WHOLE
105	487	0487	299.458	GROCERY CHECKER
106	488	0488	317.878	COUNTERGIRL
107	489	0489	311.878	WAITRESS
108	490	0490	311.878	WAITRESS II (MED
109	491	0491	317.884	FOOD SERVICE WOR
110	492	0492	330.371	BARBER
111	493	0493	332.271	COSMETOLOGIST
112	494	0494	355.878	COTTAGE PARENT
113	495	0495	355.878	PSYCHIATRIC AID
114	496	0496	359.878	TEACHER, NURSERY
115	497	0497	361.687	CLASSIFIER (LAUN
116	498	0498	363.884	PRESSER, HAND
117	499	0499	363.886	FLATWORK FINISHE
118	500	0500	372.868	CORRECTIONS OFFI
119	501	0501	373.884	FIRE FIGHTER
120	502	0502	375.268	PATROLMAN

11702	503	0503	379.	168	FISH AND GAME WA
11703	504	0504	381.	887	BUILDING CUSTODI
11704	505	0505	389.	884	EXTERMINATOR
11705	507	0507	467.	384	ARTIFICIAL-BREED
11706	508	0508	509.	886	LABORER, GENERAL
11707	510	0510	514.	885	DIE-CASTING-MACH
11708	511	0511	518.	381	FLOOR AND BENCH
11709	516	0516	524.	381	LABORER, BAKERY
11710	518	0518	526.	781	BAKER
11711	520	0520	529.	687	EGG CANDLER
11712	523	0523	529.	886	CANNERY WORKER
11713	530	0530	542.	280	STILLMAN (PETROL
11714	531	0531	553.	782	AUTOCLAVE OPERAT
11715	532	0532	556.	885	COMPRESSION-MOLD
11716	534	0534	556.	885	RECORD-PRESS TEN
11717	535	0535	559.	782	PILOT-CONTROL OP
11718	538	0538	573.	687	SORTER (BRICK AN
11719	539	0539	575.	380	FORMING-MACHINE
11720	541	0541	600.	280	MACHINIST I
11721	546	0546	615.	782	PUNCH-PRESS OPER
11722	548	0548	624.	281	FARM EQUIPMENT M
11723	555	0555	625.	281	DIESEL MECHANIC
11724	559	0559	633.	281	GAS APPLIANCE SE
11725	567	0567	651.	782	MAINTENANCE MECH
11726	569	0569	651.	782	OFFSET WEB PRESS
11727	577	0577	651.	782	PRINTER-SLOTTER
11728	584	0584	684.	782	PORTER I
11729	589	0589	689.	782	TRANSFER KNITTER
11730	592	0592	689.	386	LOOPER (HOSIERY)
11731	593	0593	689.	386	DOFFER (KNIT GOO
11732	599	0599	690.	782	FANCY STITCHER
11733	601	0601	699.	782	DIE CUTTER
11734	604	0604	705.	884	GRINDER-SHIPPER
11735	608	0608	706.	884	POWER LAWN MOWER
11736	611	0611	710.	884	GAS-PUMP-COMPUTE
11737	612	0612	715.	687	CASING INSPECTOR
11738	615	0615	715.	884	OILER (CLOCK AND
11739	626	0626	720.	281	TELEVISION SERV
11740	631	0631	726.	130	FOREMAN, ELECTRI
11741	635	0635	726.	884	CAHLE MAKER (ELE
11742	639	0639	726.	884	MONITOR I (ELECT
11743	642	0642	732.	884	FISHING ROD ASSE
11744	648	0648	737.	887	FIREWORKS ASSEMB
11745	657	0657	740.	884	DECORATOR, HAND
11746	663	0663	779.	884	FETTLER
11747	666	0666	787.	782	GLOVER SEWER
11748	669	0669	789.	887	GARMENT FOLDER
11749	671	0671	805.	281	BOTTLERMAKER I
11750	674	0674	806.	781	OUTBOARD MOTOR A
11751	678	0678	807.	381	AUTOMOBILE BODY
11752	679	0679	810.	884	WELDER, ARC
11753	680	0680	810.	884	WELDER, GAS SHIE
11754	685	0685	812.	884	WELDER, COMBINAT
11755	687	0687	824.	381	ELECTRICIAN
11756	688	0688	827.	281	ELECTRICAL APPLI
11757	694	0694	828.	281	ELECTRONICS MECH
11758	695	0695	860.	381	CARPENTER (CONSI
11759	697	0697	861.	381	BRICKLAYER
11760	701	0701	862.	381	PIPE FITTER, MAI
			899.	381	MAINTENANCE MAN,

181	706	0706	919.168	DISPATCHER, MOTO
182	707	0707	919.368	TICKET AGENT
183	709	0709	920.687	WRAPPER (LAUNDRY
184	711	0711	920.885	CONTAINER MAKER-
185	717	0717	920.887	CELOPHANE WRAPPE
186	719	0719	920.887	APPLE PACKER
187	720	0720	920.887	GARMENT PACKER
188	722	0722	920.887	SAUSAGE PACKER
189	727	0727	922.883	GASOLINE TRUCK O
190	728	0728	922.887	ORDER FILLER
191	730	0730	930.884	ROTARY-GRILLER H
192	732	0732	952.782	SUBSTATION OFFRA
193	736	0740	972.381	TRANSFERER 1 (PR
194	738	0742	973.381	JOB COMPOSITOR
195	741	0745	976.885	MOUNTER, AUTOMAT

GRAPHIC BUSINESS SYSTEMS OF HALKINS, INC. (510) 576-0447 22002-2

APPENDIX C

TITLES OF THE OAI FIRST- AND HIGHER-ORDER WORK DIMENSIONS
(FACTORS) INCLUDED IN THE REGRESSION ANALYSES

Table 10-

Titles of 132 First-Order Factors Derived from Eight
Sectional Analyses of the OAI

Factor Code	Title of Factor
<u>Information Received</u>	
A-1	Electrical and electronic information
A-2	Business-related numerical information
A-3	Biological and health information
A-4	Environmental information
A-5	Visual arts information
A-6	Information from machines
A-7	Materials information
A-8	Spatial/structural/mechanical information
A-9	Information related to people and human behavior
A-10	Performing arts information
A-11	Structure and format of written information
A-12	Information related to animals
A-13	Abstract mechanical information versus direct structural/ mechanical information
A-14	Food information
A-15	Indirect environmental information
A-16	Direct business/sales information
A-17	Unnamed
A-18	Physical science and technology information
A-19	Direct-contact information pertaining to the appearance, poise, and physical capabilities of people
A-20	Difficulty of numerical information
<u>Mental Activities</u>	
B-1	Semantic thinking
B-2	Figural information processing
B-3	Numerical and symbolic thinking
B-4	Routine symbolic and semantic information processing: clerical activities
B-5	Aesthetic/figural creativity
B-6	Associational fluency
B-7	Behavioral perception
B-8	Figural comprehension versus figural problem-solving
B-9	Memory
B-10	Semantic problem detection and comprehension

Table 10 (continued)

Factor Code	Title of Factor
<u>Physical Work Behavior</u>	
C-1	Removing material using stationary machines
C-2	Earth working and care/harvesting of plant life
C-3	Medical treatment
C-4	Repair and maintenance of machines and equipment
C-5	Combining and separating chemicals and other substances and materials
C-6	Building/repairing wooden structures and products
C-7	Fiber/thread working
C-8	Driving/operating vehicles and mechanized equipment
C-9	Surface finishing
C-10	Use of scientific and measuring devices/instruments
C-11	Operating material-joining equipment
C-12	Tending/feeding/offbearing stationary machines
C-13	Material forming
C-14	Use and handling of sporting equipment
C-15	Processing food materials
C-16	Working on the interiors and exteriors of buildings
C-17	Use of handling, holding, and supporting devices
C-18	Bonding, stitching, and fastening with portable powered tools
C-19	Measuring/inspecting physical characteristics
C-20	Unnamed
C-21	Applying heat and pressure to materials
C-22	Bonding, coating, and related activities using hand tools
C-23	Using foot-operated settings and controls
C-24	Unnamed
C-25	Working with animals
C-26	Abrading, shaping, cutting, and fusing with powered tools/equipment
C-27	Sawing and shaping with powered and non-powered tools
C-28	Testing and repairing electrical/electronic equipment
C-29	General assembling activities
C-30	Routine cleaning and object handling activities

General Physical Requirements

K-1	Arm, hand, and finger coordination and dexterity
K-2	Dynamic strength/endurance
K-3	Standing versus sitting
K-4	Balance and body coordination
K-5	Running and/or lying
K-6	Tracking

Table 10 (continued)

Factor Code	Title of Factor
<u>General Physical Requirements (continued)</u>	
K-7	General body and arm/hand strength
K-8	Climbing/kneeling/stooping/crawling
K-9	Control precision
<u>Representational Work Behavior</u>	
D-1	Verbal communication: speaking and writing
D-2	Clerical activities
D-3	Drafting and drawing
D-4	Electronic data processing
D-5	Communication by visual signals and auditory codes
D-6	Using visual and audio-visual equipment
D-7	Using written codes
D-8	Using keyboard and other office equipment
D-9	Performing numerical operations
D-10	Analyzing and synthesizing information
D-11	Recording information in writing
D-12	Using voice transmission devices
<u>Interpersonal Work Behavior</u>	
E-1	Organizing and supervising the work of others
E-2	Resolving conflicts
E-3	Serving/assisting
E-4	Being supervised
E-5	Instructing
E-6	Treating
E-7	Obtaining and giving information
E-8	Persuading
E-9	Entertaining/socializing
E-10	Assisting superiors
E-11	Unnamed
<u>Work Goals</u>	
F-1	Bookkeeping objectives
F-2	Electrical/electronic function objectives
F-3	Botanical objectives
F-4	Biological/health objectives

Table 10 (continued)

Factor Code	Title of Factor
<u>Work Goals (continued)</u>	
F-5	Technical planning/drawing objectives
F-6	Visual aesthetics objectives
F-7	Mechanical function objectives
F-8	Human behavior objectives
F-9	Environmental maintenance and planning objectives
F-10	Editing, proofing, and clerical objectives
F-11	Meteorological and astronomical objectives
F-12	Objectives related to animals
F-13	Organizational performance objectives
F-14	Material treatment/modification objectives
F-15	Performing arts objectives
F-16	Structural objectives
F-17	Terrain/earth planning and communication objectives
F-18	Sales and public relations objectives
F-19	Material handling/arrangement objectives
F-20	General biological versus health service objectives
F-21	Electrical/electronic planning and communication objectives
F-22	Assembly/fabrication objectives
F-23	Terrain/earth modification and maintenance objectives
F-24	Biological/health inspection objectives
F-25	Oral communication objectives
F-26	Structural planning and communication objectives
<u>Work Context</u>	
G-1	Incentives
G-2	Physical hazards and discomforts
G-3	Structured work situations
G-4	Variable versus consistent work schedules
G-5	Irregular versus regular work
G-6	Conflict situations
G-7	Extreme and changing temperature and humid/wet conditions
G-8	Social and civic obligations
G-9	Rush situations
G-10	Unnamed
G-11	Working outdoors
G-12	Social service context
G-13	Working alone versus working among others
G-14	Authority over others

Table 11

Titles of Higher-Order Factors Obtained from a Factor
Analysis of 132 OAI First-Order Factors*

Factor Code	Title of Factor
H-1	Human assessment and interpersonal relations activities
H-2	Sales and service activities
H-3	Clerical activities
H-4	Biological/health related activities
H-5	Mechanical repair, maintenance, and operation
H-6	Activities related to visual aesthetics
H-7	Utilization and processing of numerical data
H-8	Botanical activities
H-9	Activities related to physical science and technology
H-10	Electrical/electronic repair, maintenance, and operation
H-11	Constructing/fabricating
H-12	Operation of technical and scientific devices
H-13	Working with animals
H-14	Grooming of people
H-15	Food preparation/processing
H-16	Technical planning and drawing
H-17	Assembly/joining activities
H-18	Environmental testing and planning
H-19	Performing arts activities
H-20	Unnamed
H-21	Unnamed
H-22	Vehicle and mechanized equipment operation
H-23	Organizing and supervising the work of others
H-24	Unnamed
H-25	Instructing
H-26	Material handling
H-27	Unnamed
H-28	Verbal communication

*The factor titles contained in this table are tentative; the factors are currently being interpreted.

APPENDIX D

MATRIX OF CORRELATIONS BETWEEN 10 OAI ABILITY-REQUIREMENTS
FOR JOBS AND THE MEAN SCORES OF JOB INCUMBENTS
ON EIGHT GATE ABILITIES

Table 12

Correlations Between Ability-Requirement Estimates for 195 Jobs and Mean
GATB Scores of Job Incumbents

OAI Ability Estimate	GATB Scales							
	Verbal Aptitude	Numerical Aptitude	Spatial Aptitude	Form Percep- tion	Clerical Percep- tion	Motor Coordina- tion	Finger Dexterity	Manual Dexterity
Verbal Comprehension	<u>.70**</u>	.60	.47	.44	.55	.49	.22	.05
Number Facility	.60	<u>.66**</u>	.52	.43	.49	.41	.24	.12
Visualization	.14	.25	<u>.47**</u>	.22	.00	.00	.18	.20
Form Perception	.08	.18	.40	<u>.17*</u>	-.05	-.03	.14	.18
Perceptual Speed	.60	.58	.34	.42	<u>.57**</u>	.50	.26	.06
Eye-Hand Coordination	-.17	-.07	.14	-.02	-.23	<u>-.23**</u>	.01	.11
Finger Dexterity	-.04	.02	.21	.10	-.09	-.11	<u>.11</u>	.13
Manual Dexterity	<u>-.24</u>	-.14	.09	-.08	-.30	-.31	-.04	<u>.07</u>
Inductive Reasoning	<u>.69</u>	<u>.66</u>	.60	.48	.52	.45	.23	.12
Deductive Reasoning	<u>.69</u>	<u>.65</u>	.58	.47	.51	.44	.22	.12

APPENDIX E

**MULTIPLE AND CROSS-VALIDATED CORRELATIONS BETWEEN THE OAI
WORK-DIMENSION (FACTOR) SCORES FOR JOBS AND THE
MEAN GENERAL APTITUDE TEST BATTERY SCORES
OF JOB INCUMBENTS**

Table 13

Multiple and Cross-Validated Correlations Between the OAI Higher-Order Work-Dimension Scores for Jobs and the Mean GATB Scores of Job Incumbents: Multiple Linear Regression Procedure Including the 10 Work Dimensions Having the Highest Bivariate Correlations with the Criterion Variable

GATB Tests	Multiple Correlations ^a			Cross-Validated Correlations	
	Total Sample (n=195)	Sub-sample 1 (n=94)	Sub-sample 2 (n=101)	Subsample 1 to Subsample 2	Subsample 2 to Subsample 1
Verbal Aptitude (V)	.76**(10)	.80**(10)	.73**(10)	.65**	.72**
Numerical Aptitude (N)	.69**(10)	.75**(10)	.66**(10)	.61**	.59**
Spatial Aptitude (S)	.66**(10)	.75**(10)	.68**(10)	.55**	.44**
Form Perception (P)	.58**(10)	.64**(10)	.50**(10)	.44**	.30**
Clerical Perception (Q)	.69**(10)	.72**(10)	.68**(10)	.66**	.63**
Motor Coordination (K)	.64**(10)	.67**(10)	.64**(10)	.58**	.55**
Finger Dexterity (F)	.52**(10)	.51**(10)	.50**(10)	.27**	.31**
Manual Dexterity (M)	.40**(10)	.48*(10)	.45*(10)	.23*	.17

^aThe numbers in parentheses to the right of the correlation coefficients indicate the numbers of work dimensions retained in the regression models.

*p < .05

**p < .01

Table 14

Multiple and Cross-Validated Correlations Between the OAI Higher-Order Work-Dimension Scores for Jobs and the Mean GATE Scores of Job Incumbents: Forward Stepwise Selection Procedure Including Up to 10 Work Dimensions

GATE Tests	Multiple Correlations ^a			Cross-Validated Correlations	
	Total Sample (n=195)	Sub-sample 1 (n=94)	Sub-sample 2 (n=101)	Subsample 1 to Subsample 2	Subsample 2 to Subsample 1
Verbal Aptitude (V)	.76** (9)	.79** (8)	.66** (7)	.63**	.68**
Numerical Aptitude (N)	.69** (9)	.63** (5)	.60** (6)	.58**	.62**
Spatial Aptitude (S)	.60** (9)	.55** (4)	.56** (5)	.47**	.50**
Form Perception (P)	.57** (9)	.46** (4)	.50** (5)	.32**	.46**
Clerical Perception (Q)	.68** (8)	.67** (5)	.68** (7)	.62**	.66**
Motor Coordination (K)	.63** (7)	.62** (6)	.57** (5)	.56**	.45**
Finger Dexterity (F)	.50** (8)	.17 (1)	.44** (5)	.18	.26*
Manual Dexterity (M)	.36** (6)	.36** (3)	.30** (2)	.12	.11

^aThe numbers in parentheses to the right of the correlation coefficients indicate the numbers of work dimensions retained in the regression model.

*p < .05

**p < .01

Table 15

Multiple and Cross-Validated Correlations Between the OAI Higher-Order Work-Dimension Scores for Jobs and the Mean GATB Scores of Job Incumbents: Stepwise Procedure Including 27 Higher-Order Work Dimensions

GATB Tests	Multiple Correlations ^a			Cross-Validated Correlations	
	Total Sample (n=195)	Sub-sample 1 (n=94)	Sub-sample 2 (n=101)	Subsample 1 to Subsample 2	Subsample 2 to Subsample 1
Verbal Aptitude (V)	.83**(15)	.89**(14)	.78**(10)	.71**	.73**
Numerical Aptitude (N)	.77**(15)	.79**(11)	.69**(7)	.62**	.48**
Spatial Aptitude (S)	.71**(13)	.80**(12)	.66**(6)	.59**	.36**
Form Perception (P)	.63**(12)	.70**(10)	.52**(6)	.44**	.40**
Clerical Perception (Q)	.71**(9)	.70**(6)	.74**(9)	.63**	.65**
Motor Coordination (K)	.64**(8)	.65**(7)	.68**(8)	.54**	.51**
Finger Dexterity (F)	.52**(9)	.22*(1)	.60**(7)	-.13	.29**
Manual Dexterity (M)	.26**(2)	.31**(2)	.30**(2)	.01	.11

^aThe numbers in parentheses to the right of the correlation coefficients indicate the numbers of work dimensions retained in the regression model. A limit of 15 was set on the number of work dimensions retained.

*p < .05

**p < .01

Table 16

Multiple and Cross-Validated Correlations Between the OAI First-Order Work-Dimension Scores for Jobs and the Mean GATB Scores of Job Incumbents: Forward Stepwise Procedure Including 132 First-Order Work Dimensions

GATB Tests	Multiple Correlations ^a			Cross-Validated Correlations	
	Total Sample (n=195)	Sub-sample 1 (n=94)	Sub-sample 2 (n=101)	Subsample 1 to Subsample 2	Subsample 2 to Subsample 1
Verbal Aptitude (V)	.86**(15)	.93**(15)	.91**(15)	.67**	.66**
Numerical Aptitude (N)	.80**(15)	.90**(15)	.87**(14)	.65**	.55**
Spatial Aptitude (S)	.78**(15)	.82**(11)	.85**(15)	.55**	.35**
Form Perception (P)	.71**(15)	.86**(15)	.81**(15)	.28**	.28**
Clerical Perception (Q)	.79**(15)	.86**(15)	.87**(15)	.61**	.51**
Motor Coordination (K)	.73**(15)	.85**(15)	.82**(15)	.37**	.29**
Finger Dexterity (F)	.59**(12)	.80**(15)	.72**(11)	.25**	.33**
Manual Dexterity (M)	.57**(11)	.78**(14)	.68**(15)	.18	.12

^aThe numbers in parentheses to the right of the correlation coefficients indicate the numbers of work dimensions retained in the regression models. A limit of 15 was set on the number of work dimensions retained.

*p < .05

**p < .01

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